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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
QUINTO, KEVIN V	
ART UNIT	**PAPER NUMBER**
2826	

DATE MAILED: 03/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/033,743	NARAYAN, K.S.	
	Examiner	Art Unit	
	Kevin Quinto	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 June 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *17-22* is/are allowed.

6)☒ Claim(s) *1-16 and 24-27* is/are rejected.

7)☒ Claim(s) *23* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *28 June 2002*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 12 and 20 are objected to because of the following informalities: buckminsterfullerene is incorrectly spelled "buckministerfullerene." Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-5, 9, 11, 13, 14, 16, 25, 25, and 27 are rejected under 35 U.S.C. 102(e) as being anticipated by Chandross et al. (USPN 6,197,663 B1).

4. In reference to claim 1, Chandross et al. (USPN 6,197,663 B1, hereinafter referred to as the "Chandross" reference) discloses a similar device. Figure 1 of Chandross illustrates a photosensing organic field effect transistor with a substrate insulating layer (20) having a high relative dielectric constant and a first side and a second side. A gate electrode (15), which is an electrical conductor, is positioned adjacent to the first side of the insulating layer (20). A semiconducting polymer layer

(35), responsive to incident light (column 5, lines 35-38), has a first side, a second side, a first end, and a second end. The semiconducting polymer layer (35) is adjacent to the second side of the insulating layer (20). A source electrode (25), which is an electrical conductor, is in electrical contact with the first end of the semiconducting polymer layer (35). A drain electrode (30), which is an electrical conductor, is in electrical contact with the second end of the semiconducting polymer layer (35).

5. In reference to claim 2, Chandross et al. (USPN 6,197,663 B1) discloses a similar device. Figure 1 of Chandross illustrates a photosensing organic field effect transistor with a substrate insulating layer (20) having a high relative dielectric constant with a first side, a second side, a first end, and a second end. A gate electrode (15), which is an electrical conductor, is positioned adjacent to the first side of the insulating layer (20). A source electrode (25), which is an electrical conductor, is in electrical contact with the first end of the second side of the substrate insulating layer (20). A drain electrode (30), which is an electrical conductor, is in electrical contact with the second end of the second side of the substrate insulating (20). A semiconducting polymer layer (35), responsive to incident light (column 5, lines 35-38), is in electrical contact with the second side of the insulating layer (20), and the source (25) and the drain (30) electrodes.

6. With regard to claims 3, 14, and 16, Chandross discloses the use of regio-regular poly(hexylthiophene) or poly 3-hexylthiophene or P3HT as the semiconducting polymer layer (column 6, lines 60-65). Tessler et al. (USPN 6,603,139 B1, hereinafter referred

to as the "Tessler" reference) discloses that P3HT has a mobility greater than 0.01 cm^2/V-sec (column 12, lines 1-3).

7. With regard to claim 4, Chandross discloses the use of polyimide (column 5, lines 49-54) as the insulating layer (20). Izumi et al. (USPN 6,480,577, hereinafter referred to as the "Izumi" reference) discloses that polyimide has a dielectric constant greater than 3.0 (column 11, lines 17-20). Thus the polyimide insulating layer of Chandross meets the limitation of the claim.

8. In reference to claim 5, Chandross discloses the use of polyimide (column 5, lines 49-54), which is a polymeric material, as the insulating layer (20).

9. In reference to claim 9, Chandross discloses the use of polyimide as the insulating layer (20) with a thickness of "about 0.5 μm" or 500 nm (column 5, lines 49-54). Mihara (USPN 5,329,112) discloses a polyimide at a thickness which is greater than 500 nm (1300 nm) but is still regarded as transparent (column 6, lines 23-27). Thus the insulating layer (20) of Chandross is at least partially transparent.

10. In reference to claim 11, the gate electrode (15) is 100 nm (column 5, lines 39-41). Kawakami et al. (USPN 5,569,565, hereinafter referred to as the "Kawakami" reference) discloses that gold at this thickness is semi-transparent to optical radiation (column 9, lines 41-44).

11. In reference to claims 13, 24, 25, and 27, these modes of operation are understood to take place when the device is used as a light sensor.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chandross et al. (USPN 6,197,663 B1) in view of Garnier et al. (USPN 5,347,144).

14. In reference to claim 6, Chandross does not disclose the use of polyvinyl alcohol as the gate insulator. However the use of polyvinyl alcohol as a gate insulator is well known in the art. Garnier et al. (USPN 5,347,144, hereinafter referred to as the "Garnier" reference) discloses that polyvinyl alcohol is a desirable gate insulator since it has a sufficiently high dielectric constant that allows an improved quality of carriers (column 2, lines 43-58). In view of Garnier, it would therefore be obvious to use polyvinyl alcohol as the gate insulator in the device of Chandross.

15. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chandross et al. (USPN 6,197,663 B1) in view of Aratani et al. (USPN 5,705,826).

16. In reference to claim 7, Chandross does not disclose the use of polymethyl methacrylate as the gate insulator. However the use of polymethyl methacrylate as a gate insulator is well known in the art. Aratani et al. (USPN 5,705,826, hereinafter referred to as the "Aratani" reference) discloses that polymethyl methacrylate is a desirable gate insulator when used in conjunction with an organic semiconductor since the same process may be used to fabricate both the gate insulator and the organic

semiconductor (column 8, lines 44-57). In view of Aratani, it would therefore be obvious to use polymethyl methacrylate as the gate insulator in the device of Chandross.

17. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chandross et al. (USPN 6,197,663 B1) in view of Dimitrakopoulos et al. (USPN 5,981,970).

18. In reference to claim 8, Chandross does not disclose the use of an inorganic gate insulator. However the use of an inorganic gate insulator is well known in the art. Dimitrakopoulos et al. (USPN 5,981,970, hereinafter referred to as the "Dimitrakopoulos" reference) discloses the use of inorganic gate insulators in order to attain the advantage of a higher mobility at lower voltages (column 5, lines 55-67 and column 6, lines 1-14). In view of Jones, it would therefore be obvious to use an inorganic gate insulator in the device of Dimitrakopoulos.

19. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chandross et al. (USPN 6,197,663 B1) in view of Jones et al. (USPN 6,329,226 B1).

20. In reference to claim 10, Chandross does not disclose the use of a silicon dioxide gate insulator. However the use of a silicon dioxide gate insulator is well known in the art. Jones et al. (USPN 6,329,226 B1, hereinafter referred to as the "Jones" reference) discloses that silicon dioxide is a desirable gate insulator since it can be fabricated with a low cost process (column 8, lines 44-57). In view of Jones, it would therefore be obvious to use silicon dioxide as the gate insulator in the device of Chandross.

21. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chandross et al. (USPN 6,197,663 B1) in view of Yu et al. (USPN 6,303,943 B1) and further in view of Nishizawa (USPN 4,613,881).

22. In reference to claim 12, Chandross does not disclose the use of an additional polymer matrix with the semiconducting polymer layer. However the use of an additional polymer with organic semiconductors is well known in the art. Yu et al. (USPN 6,303,943 B1, hereinafter referred to as the "Yu" reference) discloses that the use of an additional polymer matrix such as buckminsterfullerene or its derivatives enhances photosensitivity (column 3, lines 9-19). Furthermore, high sensitivity is known to be a desirable quality in phototransistors (Nishizawa, USPN 4,613,881, column 1, lines 15-24). In view of Yu and Nishizawa, it would therefore be obvious to use an additional polymer matrix with the semiconducting polymer layer in the device of Chandross.

23. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chandross et al. (USPN 6,197,663 B1) in view of Yu et al. (USPN 6,303,943 B1) and further in view of Yu et al. (USPN 6,303,943 B1).

24. In reference to claim 15, Chandross does not disclose the use of poly (3-octylthiophene) as the semiconducting polymer layer. However the use of poly (3-octylthiophene) as a light sensitive semiconductor layer is well known in the art. Yu (USPN 6,303,943 B1) discloses the use of poly (3-octylthiophene) as a light sensitive semiconductor layer (column 11, lines 24-65). Yu discloses that the advantage of using such a substance is that it allows the substrate and thus the photosensor to be flexible

(column 11, lines 31-33). In view of Yu, it would therefore be obvious to use poly (3-octylthiophene) as the light sensitive semiconductor layer.

25. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chandross et al. (USPN 6,197,663 B1) in view of Gowda et al. (USPN 5,898,168).

26. In reference to claim 26, Chandross (USPN 6,197,663) discloses a similar device. Figure 1 of Chandross illustrates a photosensing organic field effect transistor. Chandross does not disclose using the photosensing organic field effect transistor in a position sensitive detector or image sensor. However the use of phototransistors in an image sensor is well known in the art. Figure 1 of Gowda et al. (USPN 5,898,168, hereinafter referred to as the "Gowda" reference) discloses the use of a phototransistor in an imager or image sensor (column 2, lines 32-41). Chen et al. (USPN 6,248,991 B1, hereinafter referred to as the "Chen" reference) discloses that an economical manufacturing process for image sensors is desirable (column 1, lines 59-60). Chandross discloses that the manufacturing process of the device is economical (column 1, lines 47-52). In view of Chen, it would therefore be obvious to implement the device of Chandross into the image sensor of Gowda. As for the claim limitation regarding the drain current, this mode of operation is understood to take place when the device is used as a light sensor.

Allowable Subject Matter

27. Claims 17-22 are allowed.

28. Claim 23 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

29. The following is a statement of reasons for the indication of allowable subject matter: the examiner is unaware of any prior art which suggests a method of fabricating photosensing organic field effect transistor with a polyalkylthiophene body which is fabricated on a glass substrate.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Quinto whose telephone number is (571) 272-1920. The examiner can normally be reached on M-F 8AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (571) 272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KVQ

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